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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/828,446

04/20/2004

Sanjeev Aggarwal

TI 36296

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23494

7590

04/06/2006

TEXAS INSTRUMENTS INCORPORATED

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EXAMINER

CRANE, SARA W

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 04/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	10/828,446	AGGARWAL ET AL.	
	Examiner	Art Unit	
	Sara W. Crane	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 January 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) 11-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10, 21 and 22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 January 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-2, 10 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al. in view of Ko et al.

With respect to claim 1, the Inoue cover figure shows a device having a ferroelectric capacitor (abstract). The lower electrode has two layers 108 and 109. The "first electrode layer" of the claim is read on layer 108, which may be Ir (column 5, lines 5-21). The "second electrode layer" is read on layer 109, which can be IrO<sub>2</sub> (column 5, lines 5-21). Layer 110 is a ferroelectric capacitor dielectric (abstract), and there is a second electrode layer over the dielectric. The reference considered alone anticipates claim 1, and anticipation is the "epitome of obviousness." Alternatively, Ko et al. teaches with respect to figure 2 a PZT storage capacitor, where layer 230 is Iridium and layer 232 is iridium oxide (column 5, lines 47-62). It would have been obvious to use the Ko lower electrode layers as a lower electrode in a prior art capacitor such as that of Inoue et al., to obtain the advantages noted in the Ko reference, for example in the "Background of the Invention" section.

With respect to claim 2, the iridium oxide layer is a portion of the lower electrode in each of the references. With respect to claim 10, the top electrode of Inoue et al. has

the same materials in the layers (column 5, lines 41-45). With respect to claim 21, the cover figure of Inoue et al. shows a transistor having source/drain region 105, contacted by an overlying plug which passes through interlevel dielectric 107, and contacts the ferroelectric capacitor at the right side of the figure. The electrode layers of the capacitor are taught, or would have been obvious, as noted in the preceding paragraph.

Claims 3-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al. in view of Ko et al. as applied to claims 1-2, 10, and 21 above, and further in view of Hidecki, Nishihara et al., and Jia et al.

Hidecki teaches at column 7, lines 1-22, alternate materials for the lower electrode layers of a ferroelectric capacitor electrode. Multi-layers of the listed materials are taught. With respect to claims 3-6, perovskite structured materials are noted at lines 3-4, with  $\text{SrIO}_3$  and  $\text{CaRuO}_3$  listed in lines 10-12. Such materials would have been obvious for a lower electrode layer of the Inoue device, in order to obtain the known advantages of these materials (for example, to provide a substrate for the perovskite PZT of the Inoue reference, column 5, line 36 of Inoue et al.).  $\text{SrRuO}_3$  is taught as an electrode material at column 27, line 54, which is a distorted perovskite structure (Jia et al., column 4, lines 53-55). With respect to claim 7, the layer thicknesses are commensurate with prior art layer thicknesses (Ko et al., column 5, lines 50-62). With respect to claim 8, low resistivity would have been obvious because an electrode should not heat up in operation. With respect to claim 9, perovskite structure is taught for both PZT capacitor dielectric, and for an electrode material, as noted above.


Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al. and Ko et al as applied to claim 21 above, and further in view of Goo et al.

Nickel silicide layers for lowering contact resistance would have been obvious in view of such a teaching in Goo et al. (column 8, claim 8, for example).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to S. Crane, whose telephone number is (571) 272-1652.

The supervisor for Art Unit 2811, Eddie Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Sara W. Crane  
Primary Examiner  
Art Unit 2811